

CLAIMS

1. A method for the treating growth hormone related disorders characterized by growth hormone deficiencies in an animal, comprising supplying the animal with a polynucleotide sequence that encodes growth hormone releasing hormone or modified growth hormone releasing hormone.
2. A method for improving the growth and performance of an animal, comprising supplying the animal with a polynucleotide sequence that encodes growth hormone releasing hormone or modified growth hormone releasing hormone.
3. The method of Claim 1 or 2 wherein a polynucleotide sequence encoding growth hormone releasing hormone or modified growth hormone releasing hormone is contained in pharmaceutically acceptable carrier and is administered to an animal.
4. The method of Claim 3 in which the carrier is a DNA vector, a viral vector, a liposome or lipofectin.
5. The method of Claim 4 in which the DNA vector is an expression vector.
6. The expression vector of Claim 5 containing a polynucleotide sequence of growth hormone releasing hormone or modified growth hormone releasing hormone in operative association with a nucleotide regulatory sequence that controls expression of the polynucleotide.
7. The expression vector of Claim 6, wherein said regulatory element is selected from the group consisting of the cytomegalovirus hCMV immediate early gene, the early or late promoters of SV40 adenovirus, and the swine alpha-skeletal actin promoter.
8. The method of Claim 2 in which the animal is a cat, dog, cow, pig, horse, or chicken.
9. A method for the treating growth hormone related disorders characterized by growth hormone deficiencies in an animal, comprising supplying the animal with a polynucleotide sequence that encodes growth hormone or modified growth hormone.
10. A method for improving the growth and performance of an animal, comprising supplying the animal with a polynucleotide sequence that encodes growth hormone or modified growth hormone.
11. The method of Claim 9 or 10 wherein a polynucleotide sequence encoding growth hormone or modified growth hormone is contained in pharmaceutically acceptable carrier and is administered to an animal.
12. The method of Claim 11 in which the carrier is a DNA vector, a viral vector, a liposome or lipofectin.
13. The method of Claim 12 in which the DNA vector is an expression vector.
14. The method of Claim 13, wherein the expression vector includes a polynucleotide sequence of growth hormone or modified growth hormone in operative

association with a nucleotide regulatory sequence that controls expression of the polynucleotide.

15. The method of Claim 14, wherein the regulatory element is selected from the group consisting of the cytomegalovirus hCMV immediate early gene, the early or late
5 promoters of SV40 adenovirus, and the swine alpha-skeletal actin promoter.

16. The method of Claim 15 in which the animal is a dog, cat, cow, pig, horse, or chicken

17. A growth hormone releasing hormone (GHRH) variant comprising the addition of one amino acid to the amino terminus of a 29 amino acid amino terminal fragment
10 of GHRH, in a pharmaceutical formulation suitable for delivery to a human or livestock.

18. The growth hormone releasing hormone of Claim 17 wherein the amino acid is a hydrophobic residue or tyrosine.

19. A growth hormone releasing hormone variant comprising the addition of two or three amino acids to the amino terminus, of a 29 amino acid amino terminal fragment of
15 GHRH wherein the second amino acid is not proline or alanine, and in a pharmaceutical formulation suitable for delivery to a human or livestock.

20. The growth hormone releasing hormone variant of Claim 19 comprising the addition of more than three amino acids to the amino terminus of a 29 amino acid amino terminal fragment of GHRH, wherein the addition does not interfere with the functional activity
20 of growth hormone releasing hormone.

21. The growth hormone releasing hormone variant of Claim 17, 19, or 20, further comprising a substitution of glycine with alanine at residue 15.

22. The growth hormone releasing hormone variant of Claim 17, 19, or 20 further comprising a substitution of leucine with alanine at residue 22.

25 23. The growth hormone releasing hormone variant of Claim 17, 19, or 20, further comprising substitutions of glycine with alanine at residue 15 and leucine with alanine at residue 22.

24. The growth hormone releasing hormone variant of Claim 17, 19, or 20, further comprising the addition of glycine and arginine at the carboxy-terminus.

30 25. The growth hormone releasing hormone variant of Claim 18, 19, or 21 in which the amino acids are naturally occurring.

26. A polynucleotide sequence encoding the growth hormone releasing hormone variant of Claim 17, 19, or 20.

35 27. A nucleotide vector containing the polynucleotide sequence of Claim 26.

28. An expression vector containing the polynucleotide sequence of Claim 26 in operative association with a nucleotide regulatory sequence that controls expression of the polynucleotide sequence in a host cell.

5 29. The expression vector of Claim 28, wherein said regulatory element is selected from the group consisting of the cytomegalovirus hCMV immediate early gene, the early or late promoters of SV40 adenovirus, and the swine alpha-skeletal actin promoter.

30. A genetically engineered host cell that contains the polynucleotide sequence of Claim 26.

10 31. A genetically engineered host cell that contains the polynucleotide sequence of Claim 26 in operative association with a nucleotide regulatory sequence that controls expression of the polynucleotide sequence in the host cell.

15 32. A method for the treating growth hormone related disorders characterized by growth hormone deficiencies in an animal comprising supplying the animal with a polynucleotide sequence that encodes the growth hormone releasing hormone variant of Claim 17, 19, or 20.

33. A method for improving the growth and performance of an animal, comprising supplying the animal with a polynucleotide sequence that encodes a growth hormone releasing hormone variant of Claim 17, 19, or 20.

20 34. A purified polypeptide of the growth hormone releasing hormone variant of Claim 17, 19, or 20.

35. A method for the treating growth hormone related disorders characterized by growth hormone deficiencies in an animal, comprising supplying the animal with an effective amount of a polypeptide of Claim 35.

25 36. A method for improving the growth and performance of an animal, comprising supplying the animal with an effective amount of a polypeptide of Claim 34.

37. A pharmaceutical composition for promoting the expression and elevation of growth hormone in an animal, comprising administering to said animal an effective amount of the growth hormone releasing hormone variant of Claim 17, 19, or 20.

30 38. A pharmaceutical composition for the treatment of growth hormone related disorders characterized by growth hormone deficiencies in an animal, comprising administering to said animal an effective amount of the growth hormone releasing hormone variant of Claim 17, 19, or 20.

35 39. A pharmaceutical composition for the improvement of growth and performance of an animal, comprising administering to said animal an effective amount of a growth hormone releasing hormone variant of Claim 17, 19, or 20.